FIG.1 (PRIOR ART)

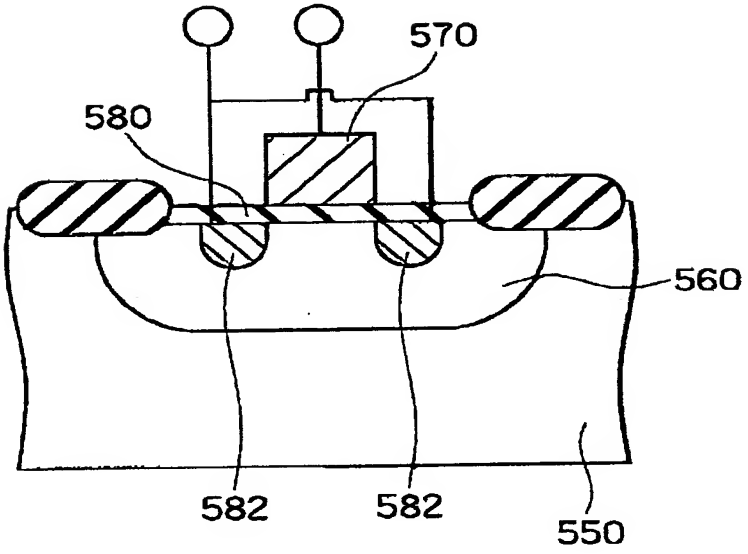


FIG.2 (PRIOR ART)

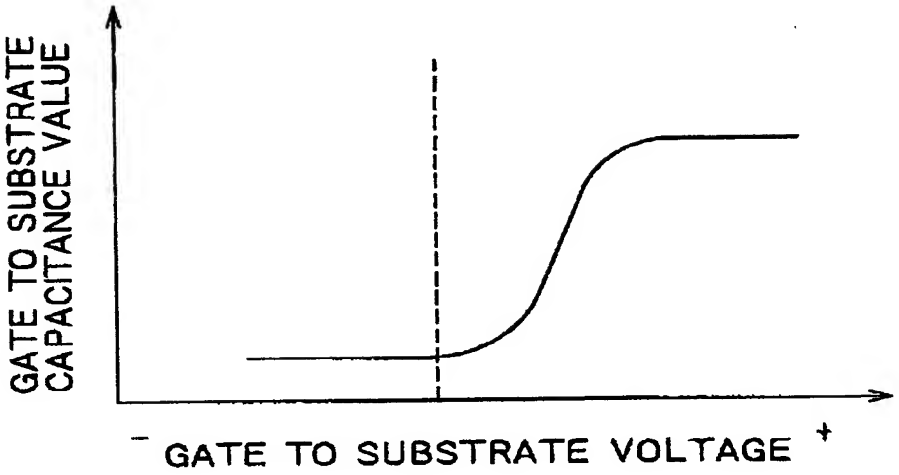


FIG.3 (PRIOR ART)

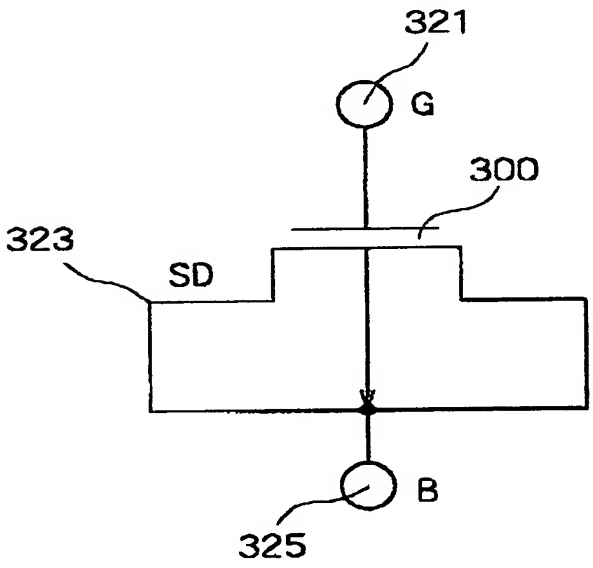


FIG.4 (PRIOR ART)

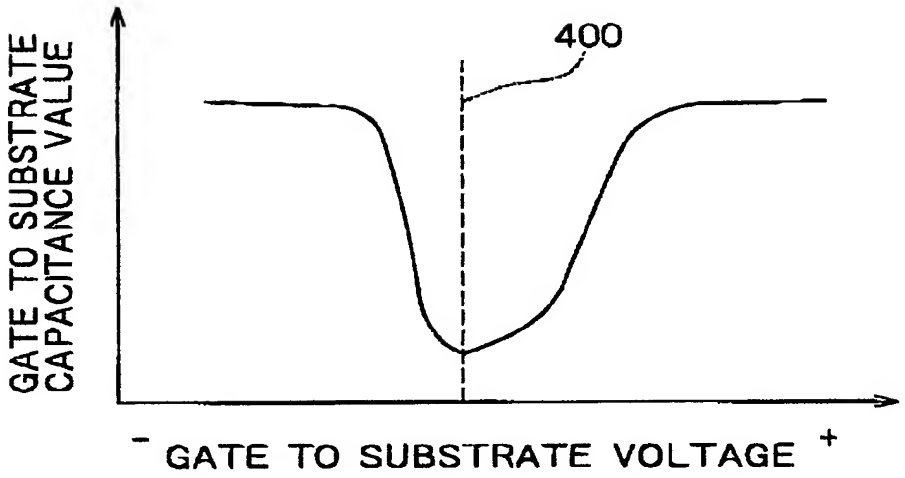


FIG. 5

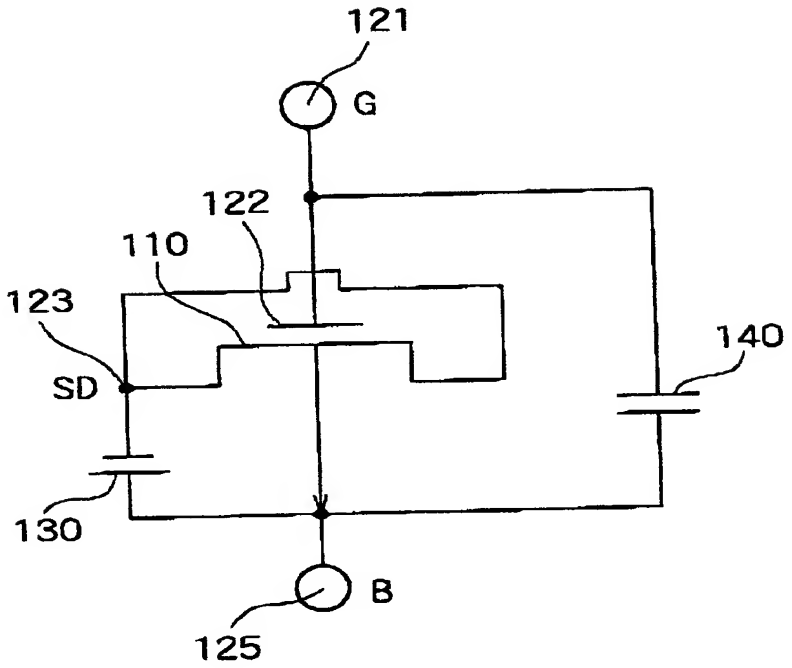

121
G
122
110
123
SD
140
130
B
125

FIG. 6

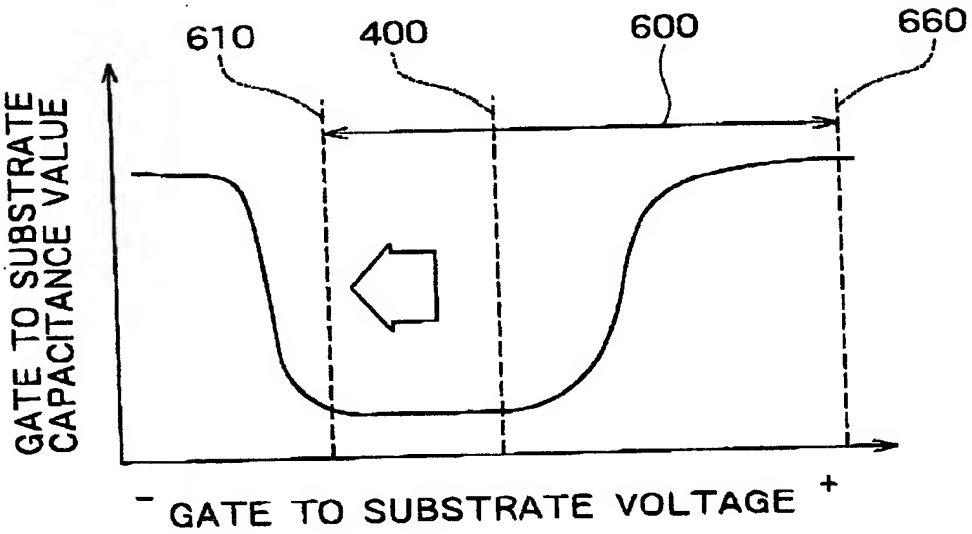

610
400
600
660
GATE TO SUBSTRATE CAPACITANCE VALUE
- GATE TO SUBSTRATE VOLTAGE +

FIG. 7

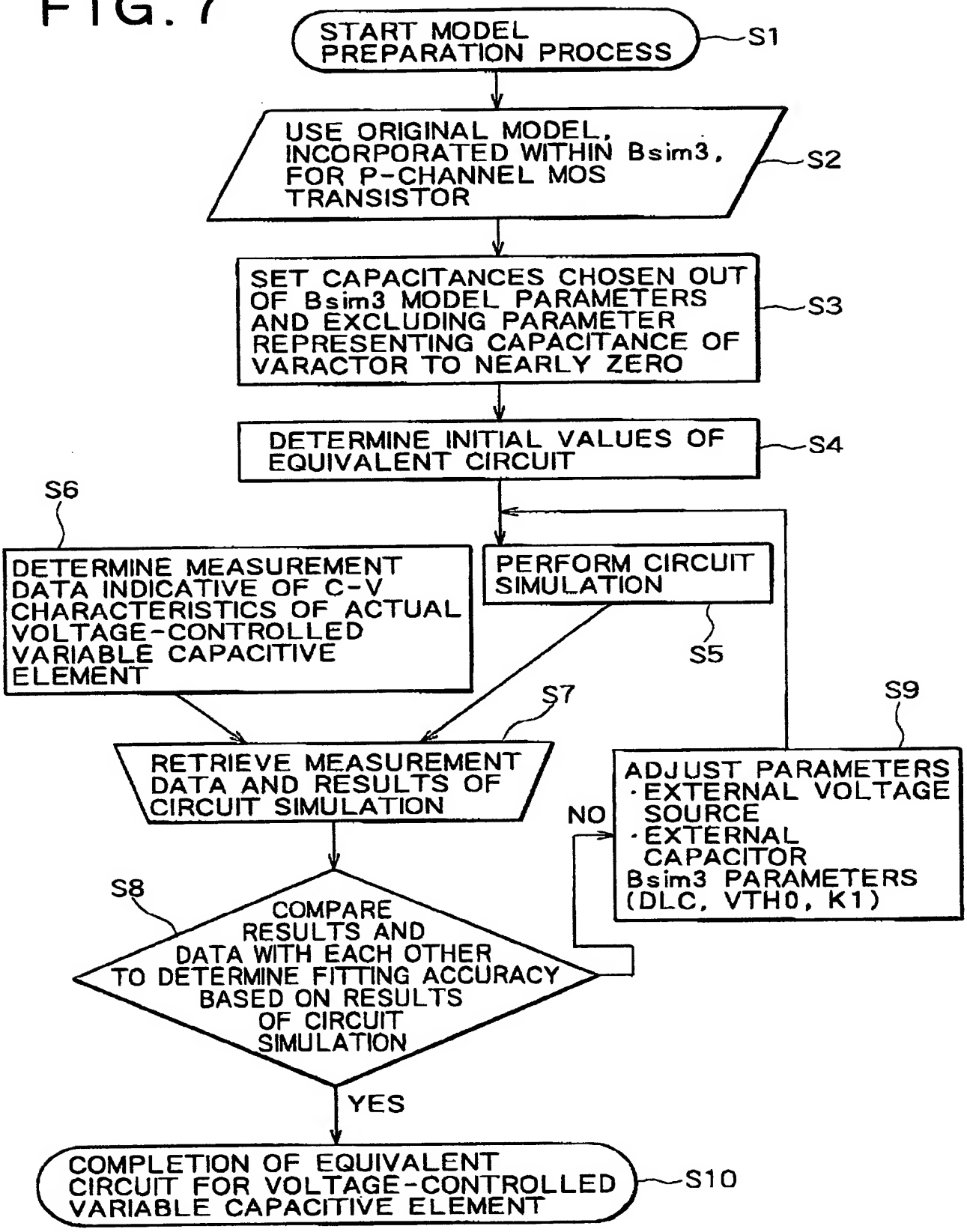

START MODEL PREPARATION PROCESS
S1
USE ORIGINAL MODEL, INCORPORATED WITHIN Bsim3, FOR P-CHANNEL MOS TRANSISTOR
S2
SET CAPACITANCES CHOSEN OUT OF Bsim3 MODEL PARAMETERS AND EXCLUDING PARAMETER REPRESENTING CAPACITANCE OF VARACTOR TO NEARLY ZERO
S3
DETERMINE INITIAL VALUES OF EQUIVALENT CIRCUIT
S4
S6
DETERMINE MEASUREMENT DATA INDICATIVE OF C-V CHARACTERISTICS OF ACTUAL VOLTAGE-CONTROLLED VARIABLE CAPACITIVE ELEMENT
PERFORM CIRCUIT SIMULATION
S5
S7
RETRIEVE MEASUREMENT DATA AND RESULTS OF CIRCUIT SIMULATION
S9
ADJUST PARAMETERS
· EXTERNAL VOLTAGE SOURCE
· EXTERNAL CAPACITOR
Bsim3 PARAMETERS (DLC, VTH0, K1)
NO
S8
COMPARE RESULTS AND DATA WITH EACH OTHER TO DETERMINE FITTING ACCURACY BASED ON RESULTS OF CIRCUIT SIMULATION
YES
COMPLETION OF EQUIVALENT CIRCUIT FOR VOLTAGE-CONTROLLED VARIABLE CAPACITIVE ELEMENT
S10

FIG. 8

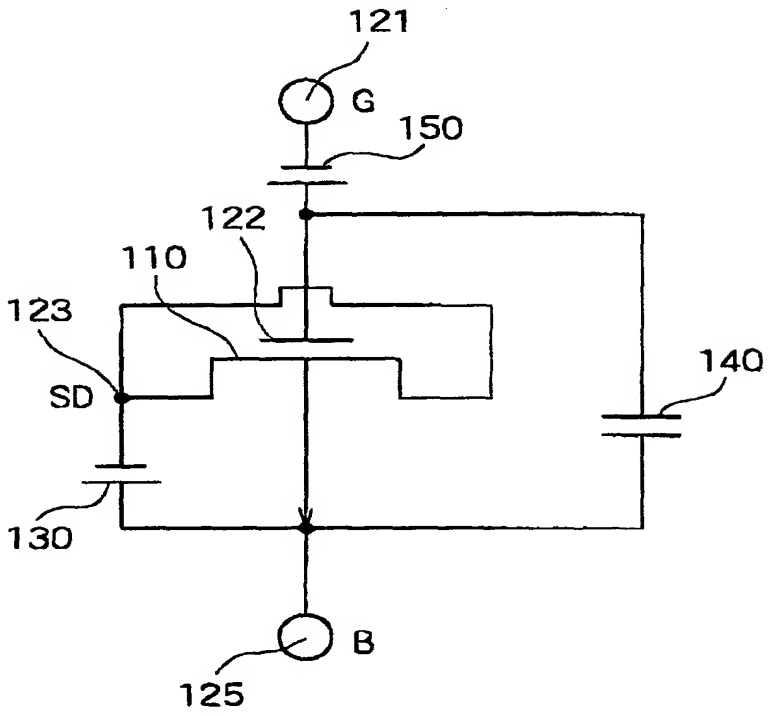


FIG.9

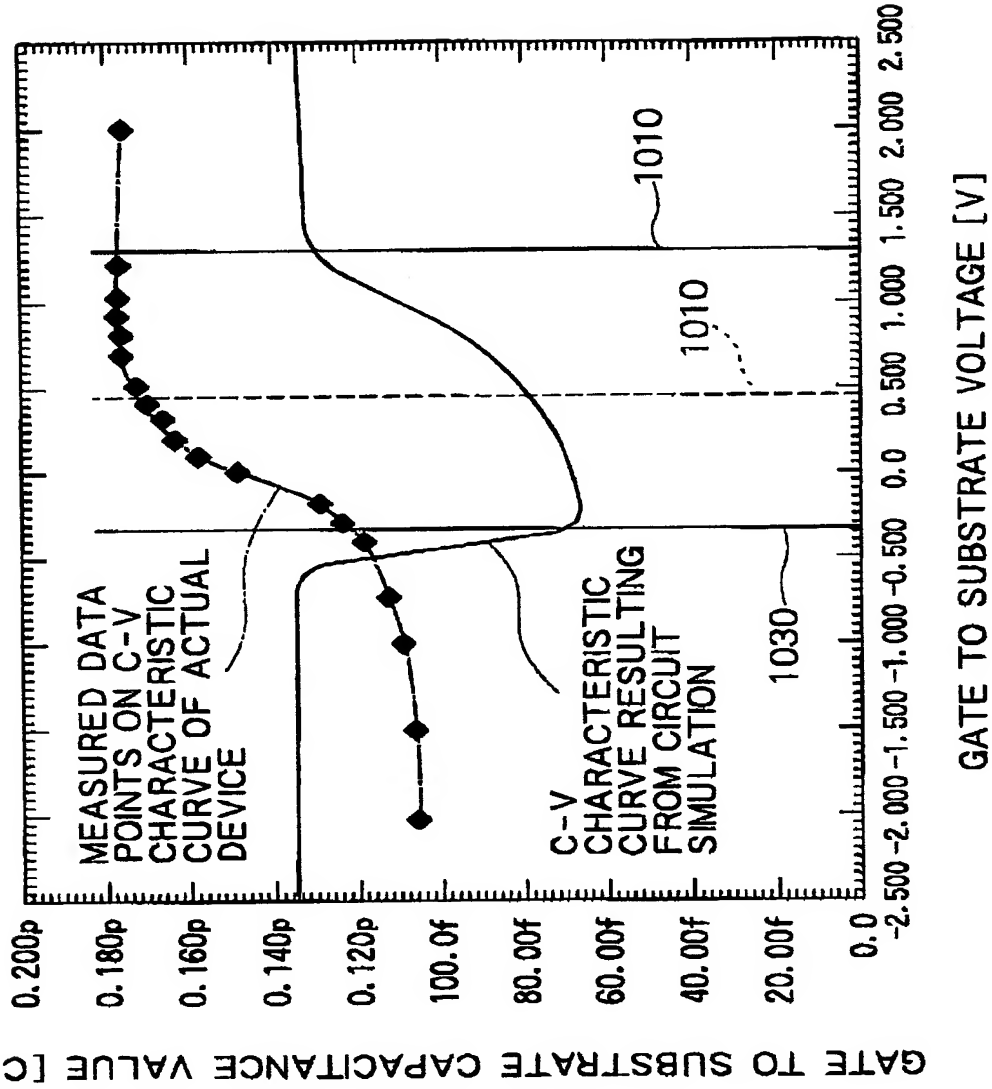

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]
MEASURED DATA POINTS ON C-V CHARACTERISTIC CURVE OF ACTUAL DEVICE
C-V CHARACTERISTIC CURVE RESULTING FROM CIRCUIT SIMULATION
1010
1010
1030

FIG. 10

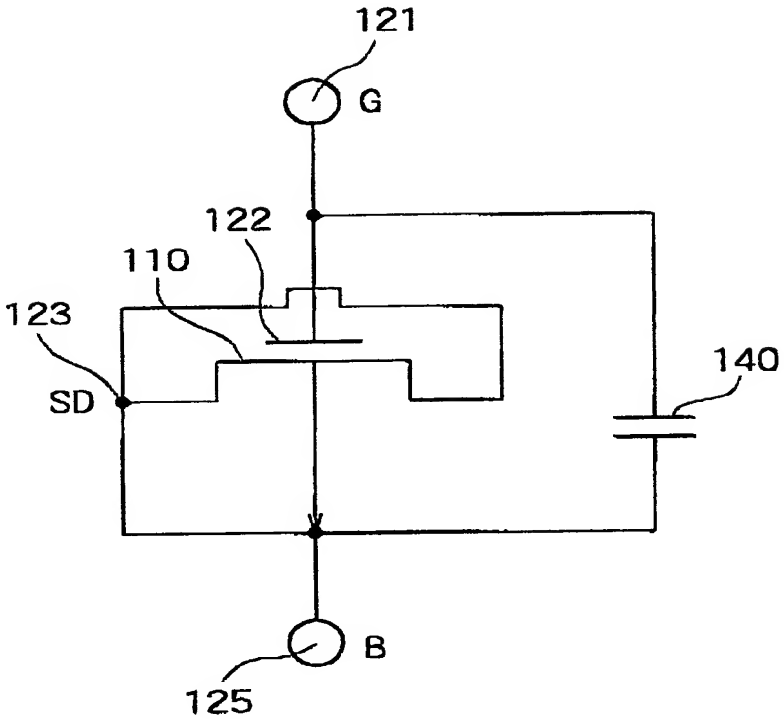


FIG. 11

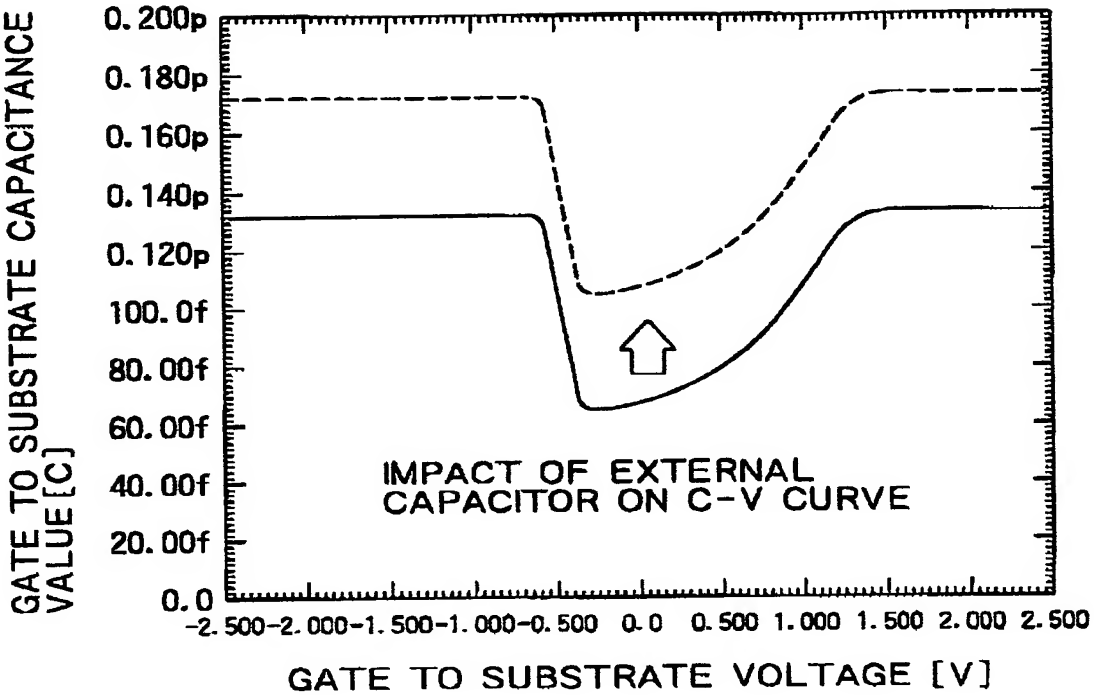

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
IMPACT OF EXTERNAL CAPACITOR ON C-V CURVE
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 12

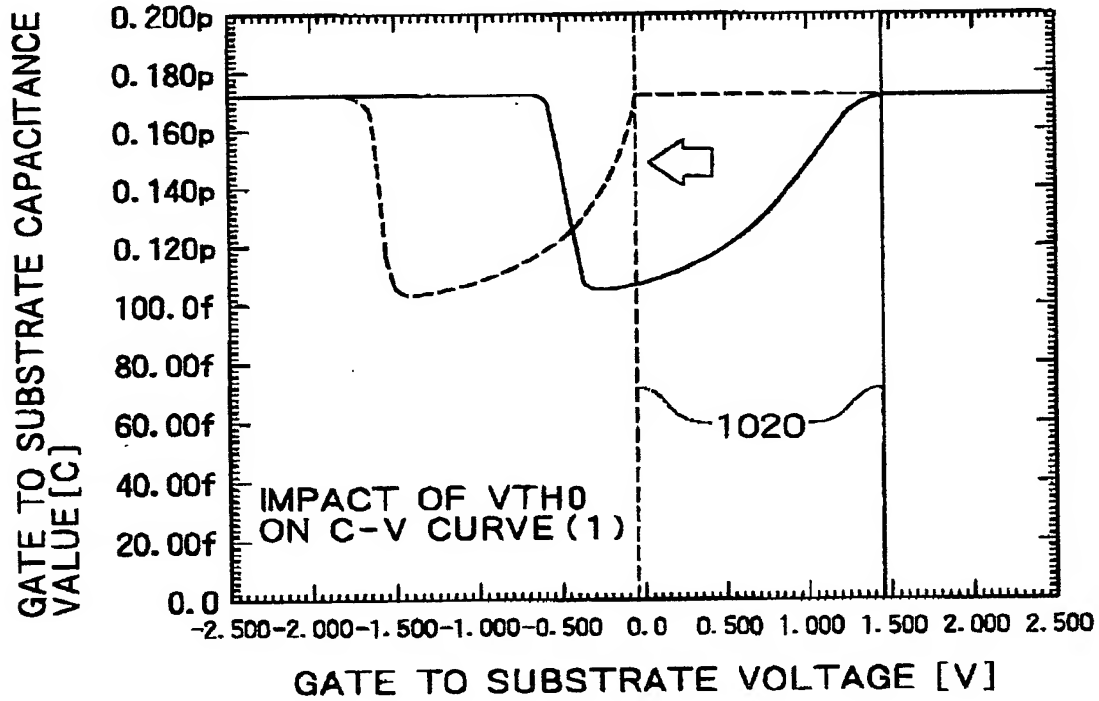

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
1020
IMPACT OF VTH0 ON C-V CURVE (1)
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 13

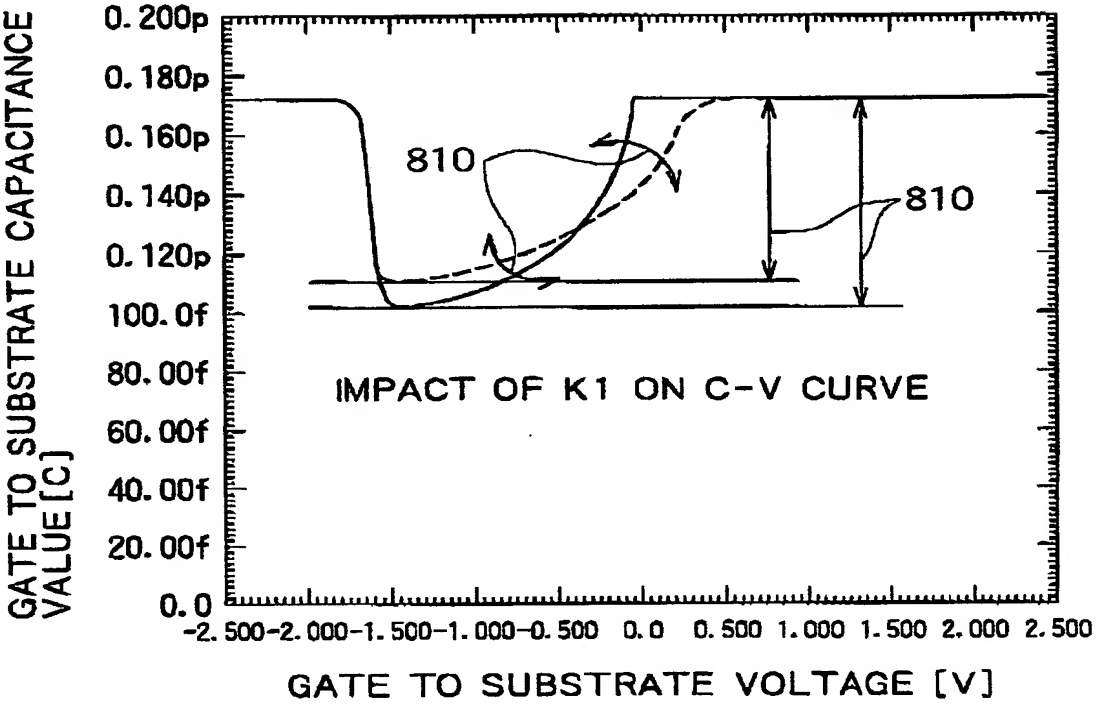

0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
GATE TO SUBSTRATE CAPACITANCE VALUE [C]
810
810
IMPACT OF K1 ON C-V CURVE
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 14

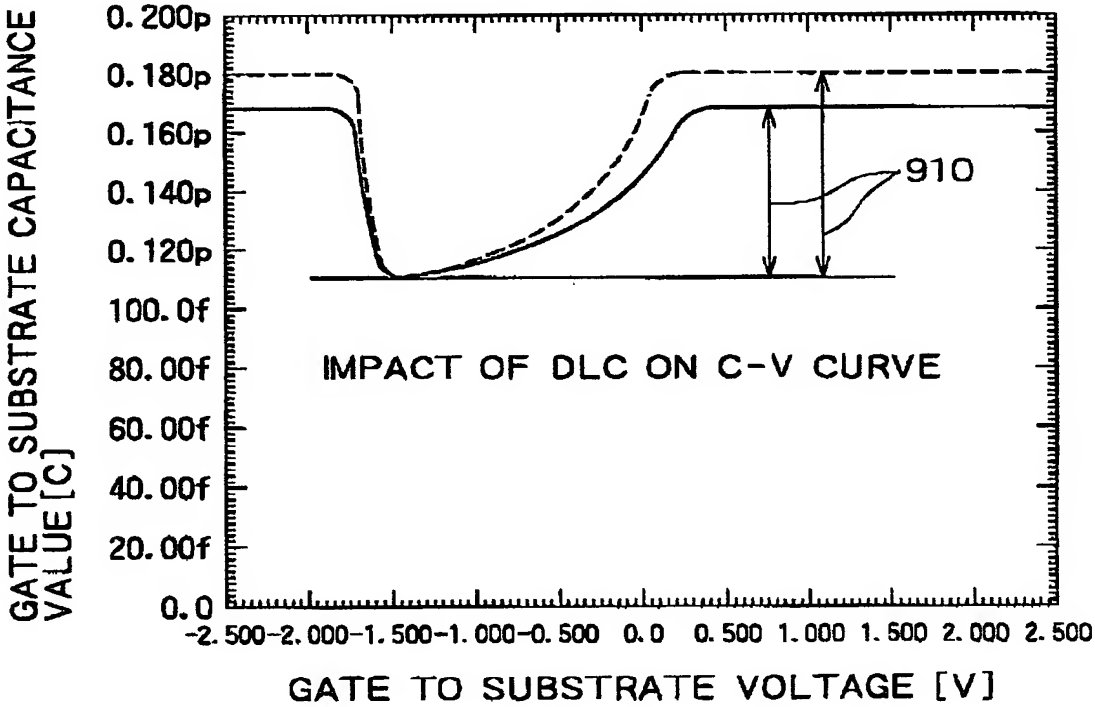

0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
GATE TO SUBSTRATE CAPACITANCE VALUE [C]
910
IMPACT OF DLC ON C-V CURVE
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 15

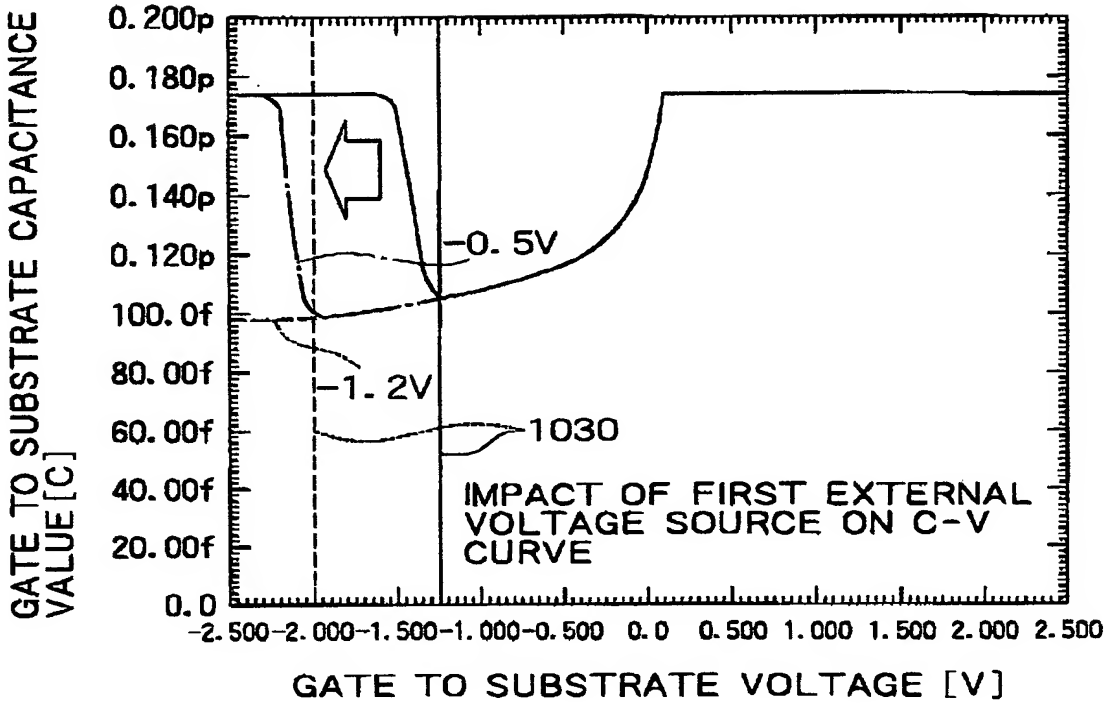

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
-0.5V
-1.2V
1030
IMPACT OF FIRST EXTERNAL VOLTAGE SOURCE ON C-V CURVE
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 16

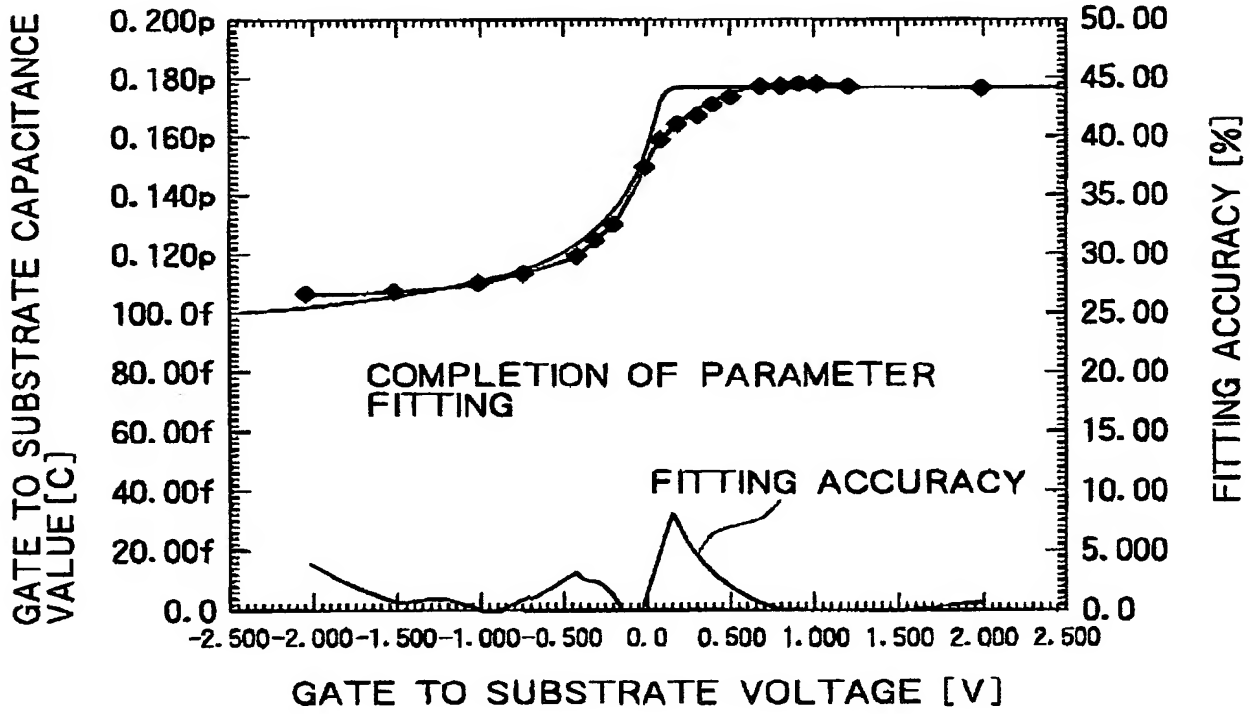

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.000
0.0
FITTING ACCURACY [%]
COMPLETION OF PARAMETER FITTING
FITTING ACCURACY
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 17

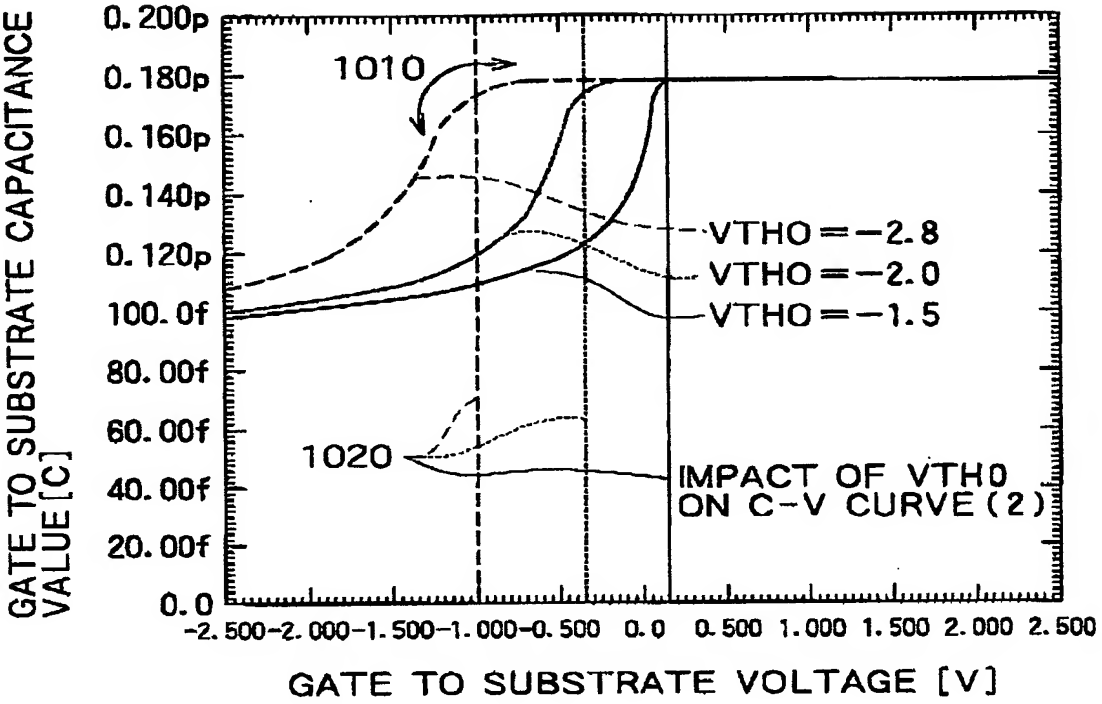

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
1010
VTHO=−2.8
VTHO=−2.0
VTHO=−1.5
1020
IMPACT OF VTH0 ON C-V CURVE (2)
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 18

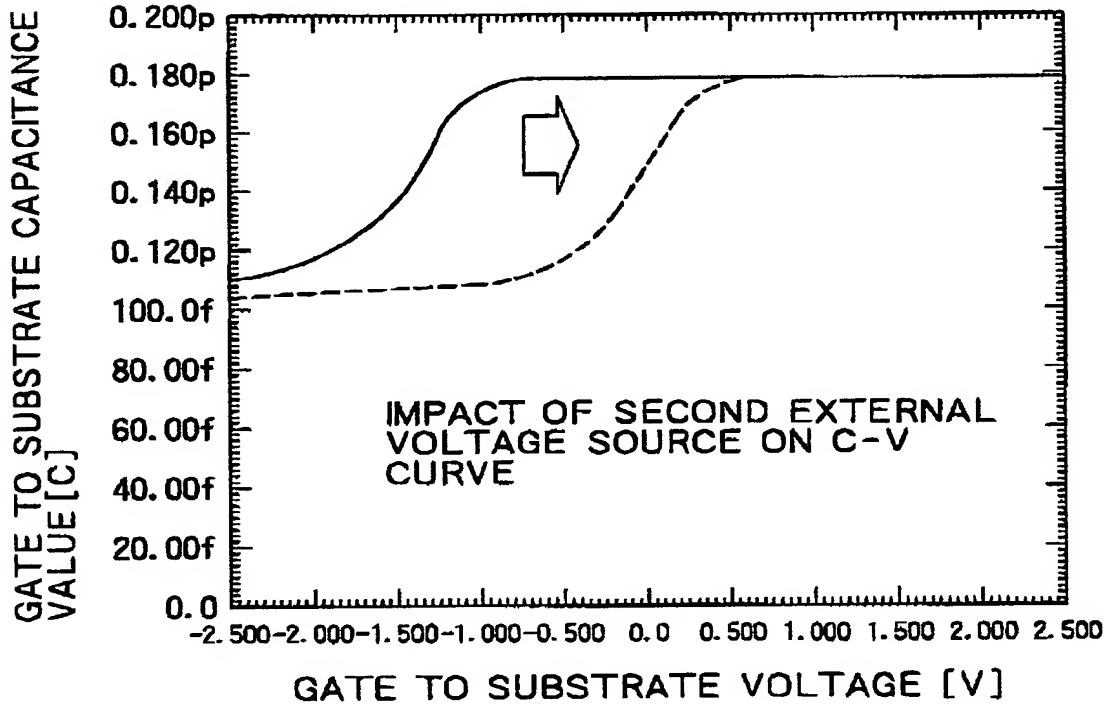

GATE TO SUBSTRATE CAPACITANCE VALUE [C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
IMPACT OF SECOND EXTERNAL VOLTAGE SOURCE ON C-V CURVE
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 19

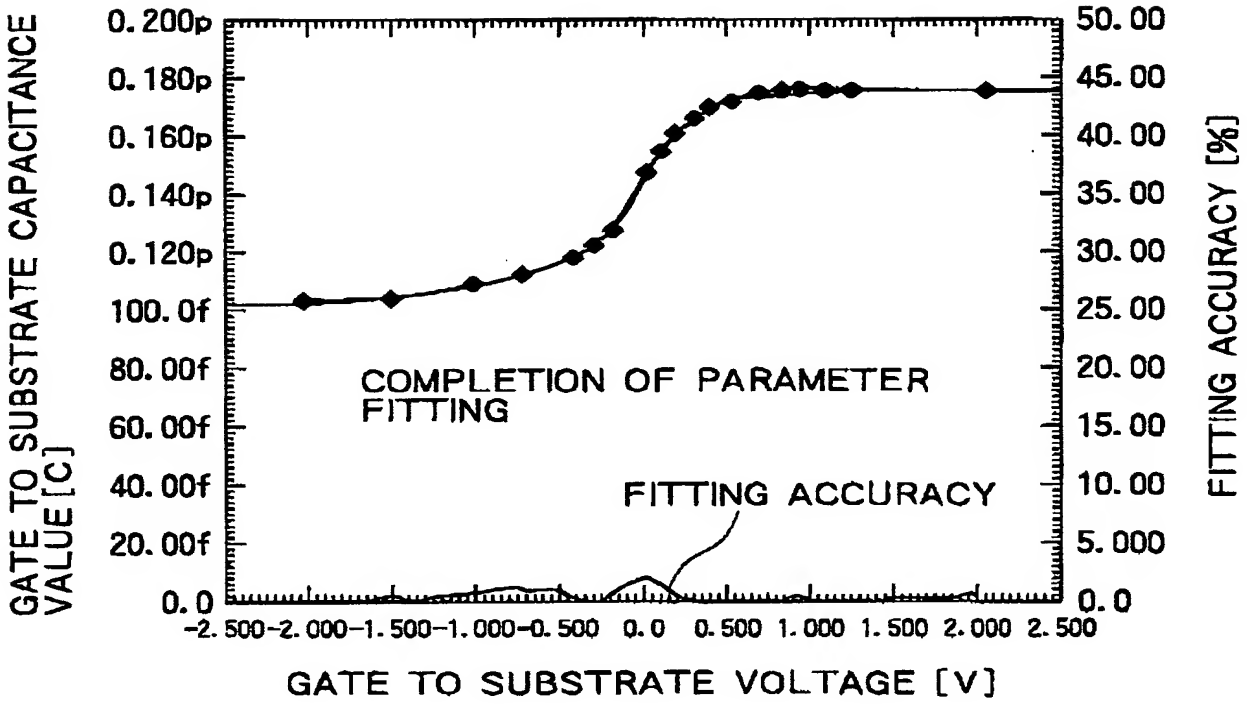

GATE TO SUBSTRATE CAPACITANCE VALUE[C]
0.200p
0.180p
0.160p
0.140p
0.120p
100.0f
80.00f
60.00f
40.00f
20.00f
0.0
COMPLETION OF PARAMETER FITTING
FITTING ACCURACY
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.000
0.0
FITTING ACCURACY [%]
-2.500 -2.000 -1.500 -1.000 -0.500 0.0 0.500 1.000 1.500 2.000 2.500
GATE TO SUBSTRATE VOLTAGE [V]

FIG. 20

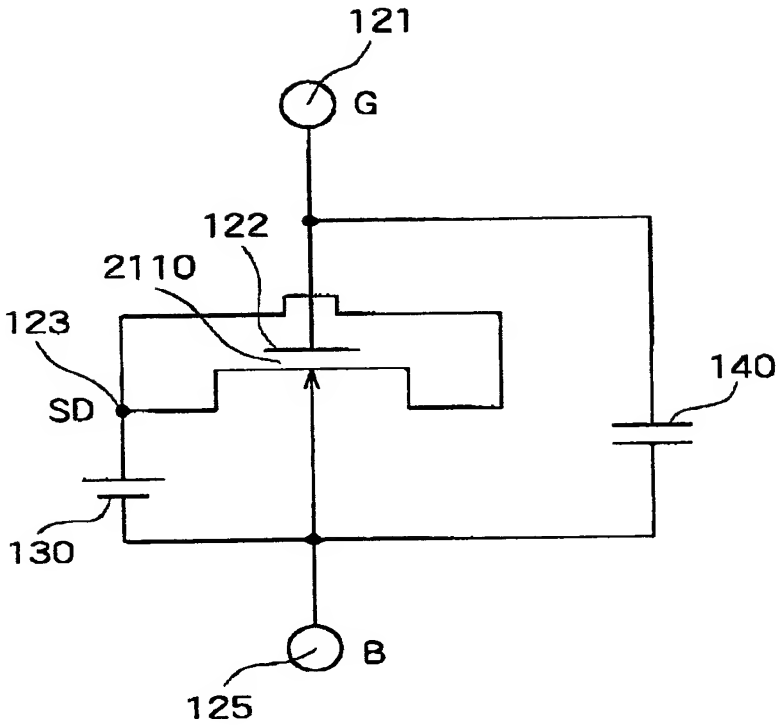
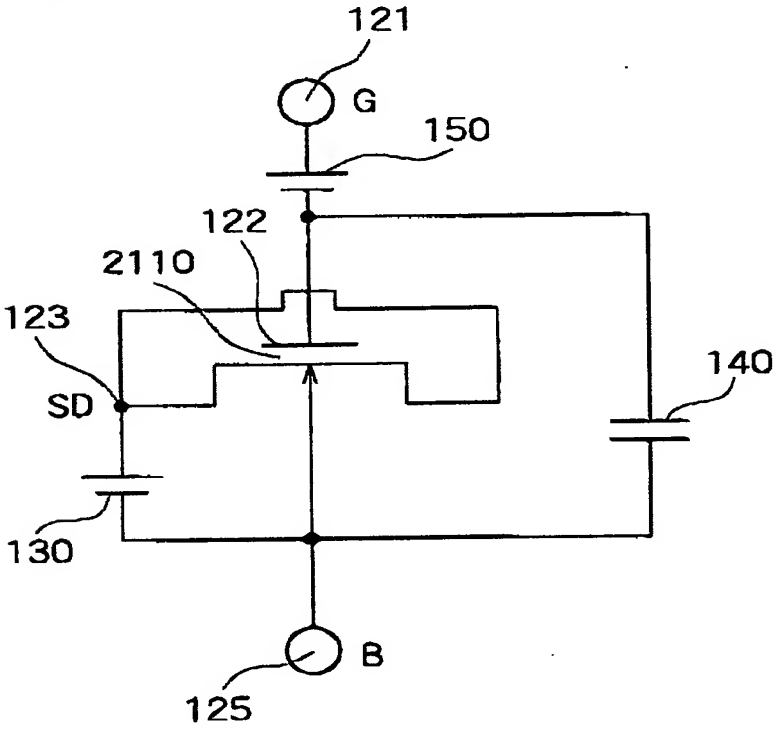

121
G
122
2110
123
SD
140
130
B
125

FIG. 21


121
G
150
122
2110
123
SD
140
130
B
125